Gateway for Accelerated Innovation in Nuclear Overview

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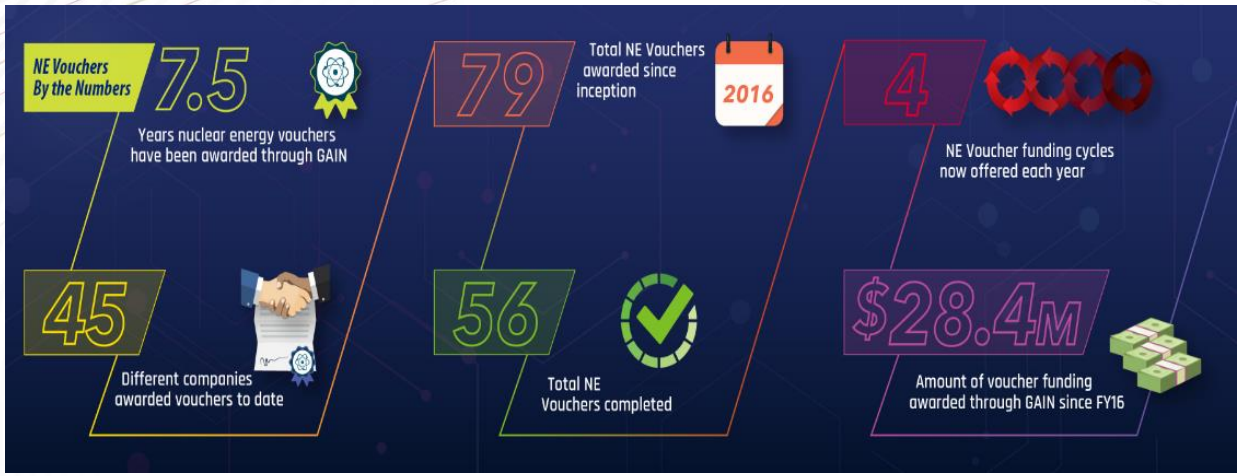
Virginia Nuclear Energy Consortium Authority

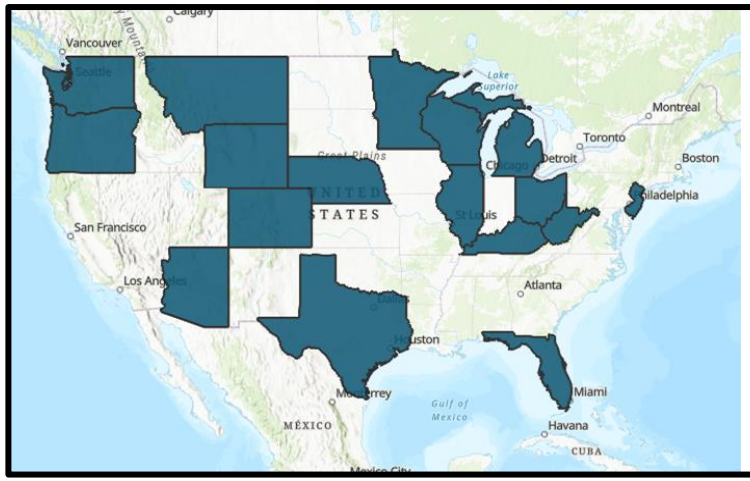
GAIN
Gateway for Accelerated Innovation in Nuclear

INL/MIS-18-50189

2023 Activities

GAIN Gateway for Accelerated Innovation in Nuclear





State Level Outreach

- Policymakers, NGOs, Utilities, Regulators, Industrials, Commissioners
- Introduce Advanced Nuclear through direct conversation or testimony
- Help connect states to financial or technical resources across DOE complex
- Looking at state level regs

Advanced Nuclear Industry Milestones

Purdue University and Duk...
DATE
4/27/2022

VA Legislature Passes Bill ...
DATE
4/11/2022

Indiana Passes SMR Bill
DATE
3/18/2022

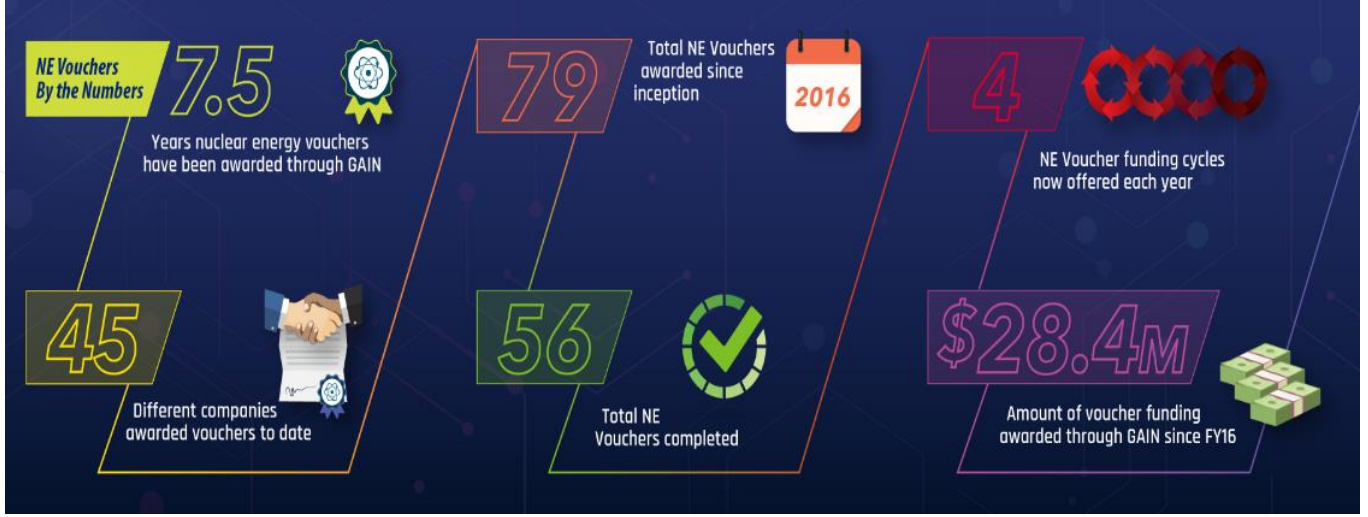
NuScale Power and KGHM ...
DATE
2/14/2022

West Virginia Repeals New...
DATE
2/8/2022

Oklo Partners with Argonn...
DATE
2/8/2022

USNC Partners with Coppe...
DATE
2/2/2022

DOE-NE Vouchers



- Vouchers competitively award access to facilities and staff in the DOE national laboratory complex – NOT a financial award
- Voucher value is ~$50K to $500K
- Voucher recipient is responsible for 20% cost share
- One-year Period of Performance
- Standard CRADA
- Available to businesses that are majority (>51%) U.S. owned
- Limit to one application per cycle
- Four cycles per year – Next deadline is May 1st 2023

GAIN Gateway for Accelerated Innovation in Nuclear

Rediscovering the past, to power the future

The Who

DOE-NE, OSTI, GAIN, the DOE laboratory complex, and industry partners

The What

A process to release export-controlled documents to industry partners

The Where

The process will happen at many locations simultaneously.

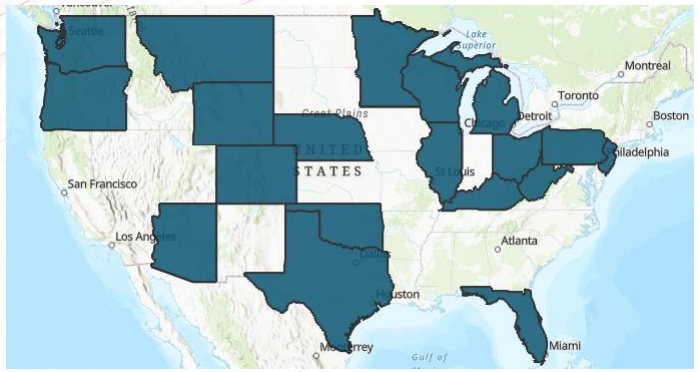
The When

Three test cases were completed over the summer 2022, full process roll-out slated for early 2023.

The Why

In the past, there has not been a way for a U.S. company to easily request and obtain access to export-controlled information.

Engagement Activities



Stakeholder Engagement Website

State Level Outreach

- Policymakers, NGOs, Utilities, Regulators, Industrials
- Introduce Advanced Nuclear through direct conversation or testimony
- Help connect states to financial or technical resources across DOE complex
- Follow nuclear related legislation

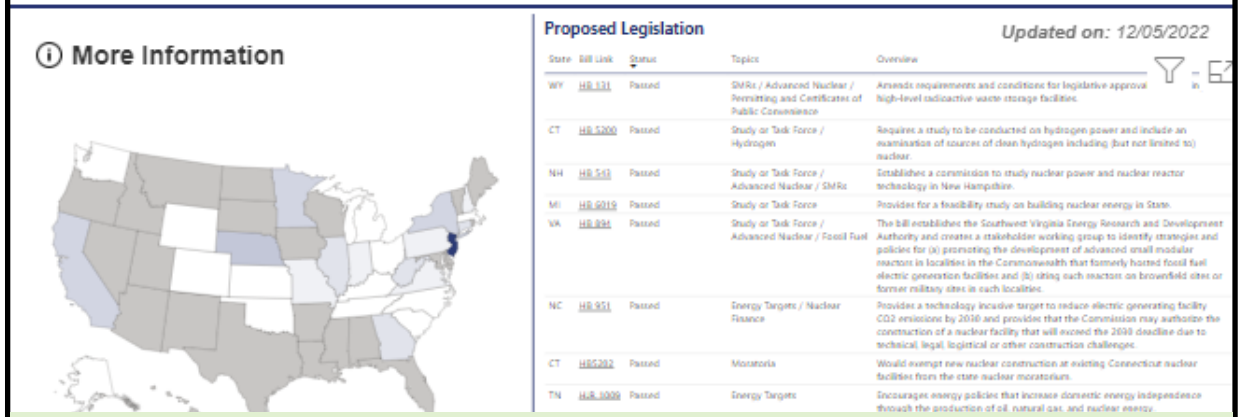
General Support:

- Curated a “new to nuclear” resource kit with information written for non-nuclear audience
- Curated an advanced nuclear milestones page to stay up to date with latest industry news
- Maintain directory of developers and supply chain companies
- Track existing and pending legislation

Specific Support:

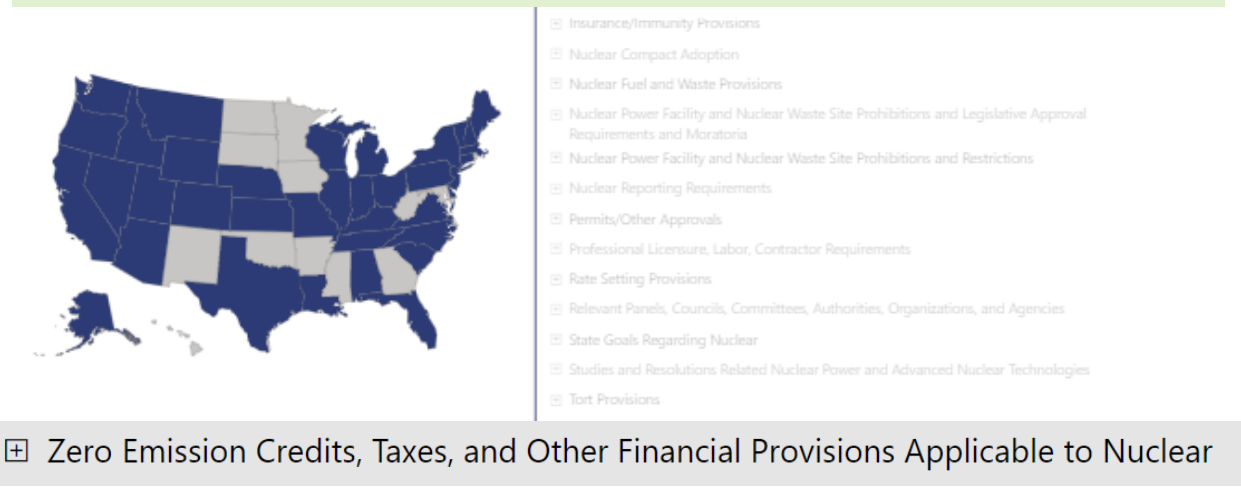
- Custom Webinar Series to State/Regional Stakeholders to Introduce Advanced Nuclear and possible applications

Legislation: 2022 Summary



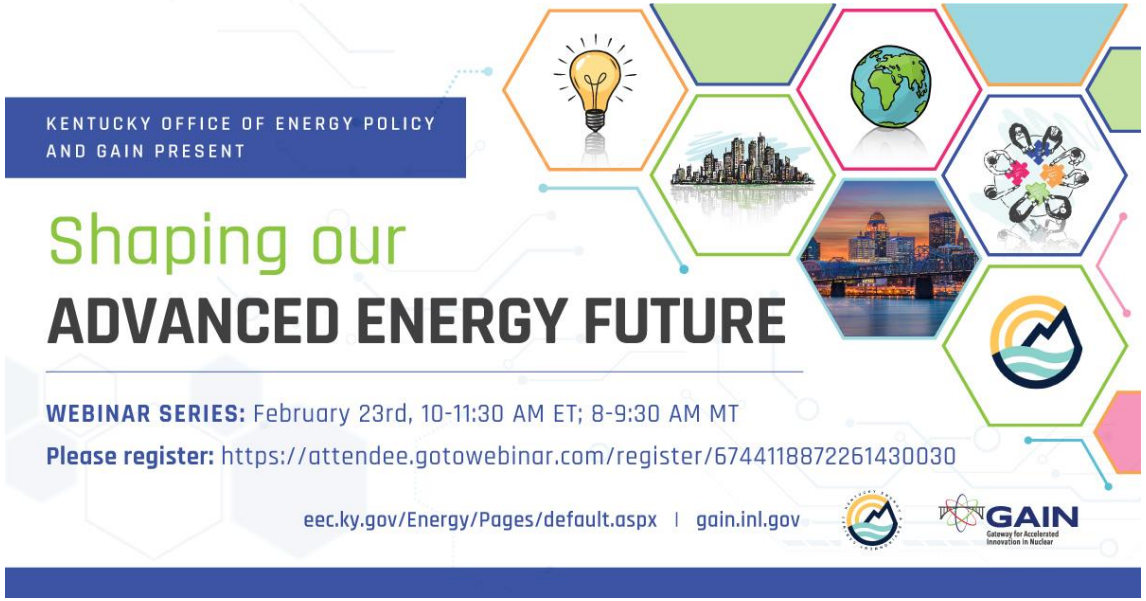
States where legislation related to nuclear power was introduced or was active in 2022. Each bill listed is accompanied by a brief overview, can be sorted by topic and status of legislation. Direct link to bill is provided as well.

Legislation: Existing Summary



Examples of Local Engagement

- Public Meetings in Arizona, Montana, Pennsylvania, and Colorado with local partners (Senators or Utility)
- Testimony to State Level Energy Committees: Maine, Minnesota, Montana, Illinois, Alaska, Colorado
- Briefing to staffers for a variety of legislative delegates in numerous states
- Customized Webinars/Workshops: Kentucky, Virginia, California
- Work with local economic development teams: West Virginia, Pennsylvania, Tennessee, Montana, Colorado, Arizona, Utah.
- Support the DOE engagement with NASEO, NARUC, Governor's Association and NCSL



COAL TO NUCLEAR
ENERGY COMMUNITY TRANSITIONS

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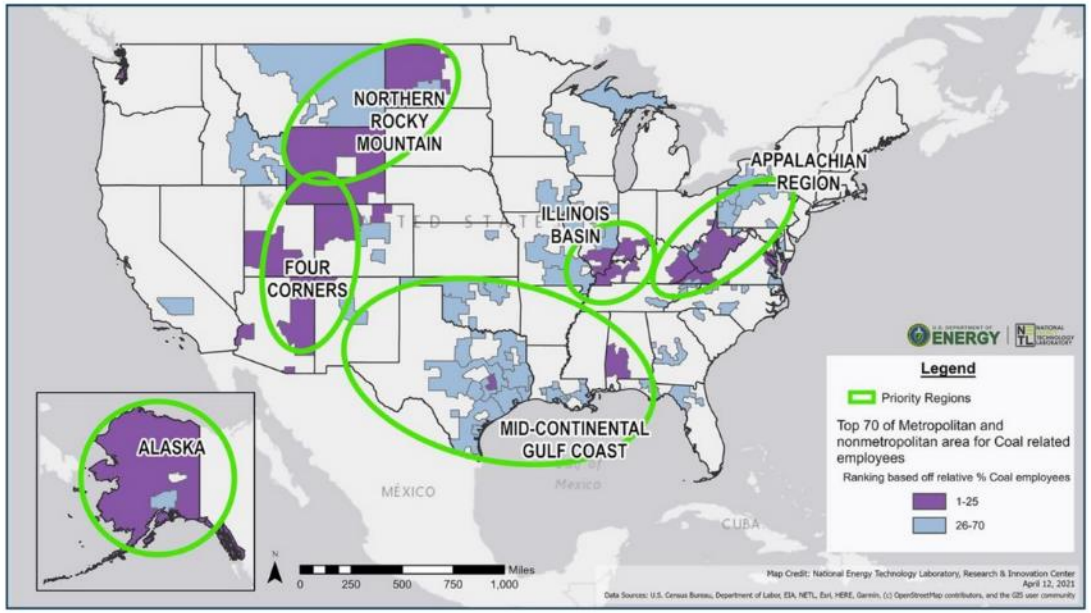
Case Study Pilot (in partnership with DOE-FECM)

GAIN is in the process of scoping several case studies of specific coal sites/plants to understand the parameters that will have the most influence on moving forward with transitioning a coal site to nuclear. Scope several this year – complete 1 or 2 in the calendar year and initiate others in the future.



TerraPower A Nuclear Innovation Company · GAIN Gateway for Accelerated Innovation in Nuclear · EPRI Electric Power Research Institute · orano · Microsoft · Bryden Wood · Fastest Path to Zero University of Michigan · Terra Praxis · Simpson Gumpertz & Heger Engineering of Structures and Building Enclosures · NEI Nuclear Energy Institute · Oak Ridge National Laboratory · TVA Tennessee Valley Authority · MIT Massachusetts Institute of Technology · University at Buffalo · INL Idaho National Laboratory · Argonne National Laboratory · CATF Clean Air Task Force · NRIC · Southern Company · SODI Southern Ohio Diversification Initiative

Coal to Nuclear Research Group

Each group is leading important projects associated with potential repurposing coal sites with nuclear technology. Use group discussions to align our individual efforts to make the most of this opportunity for the broader industry. In addition, get constructive feedback on GAIN case study pilot project.

Coronado Generating Station

Primary Objective: Assess the feasibility of transitioning from coal to nuclear; Learnings will help 6 other coal units within commuting distance

- Siting Evaluation (leveraging EPRI's Siting Guide)
  - Assess suitability of the CGS site for a nuclear power plant.
  - Identify strengths and weaknesses associated with the site.
  - Support selection of preferred nuclear technologies (based on evaluation results).
- Economic Impact Assessment
  - Evaluate economic outcomes we may expect from (a) coal plant retirement and (b) introduction of a nuclear power plant, focusing on impacts to the community.
- Nuclear Technology Assessment (leveraging EPRI's Nuclear Technology Assessment Guide)
  - Identify and document candidate nuclear technologies that could be leveraged at CGS, building off siting evaluation results.

Coronado Generating Station
Owned/Operated by
Salt River Project
Located in
Saint Johns, AZ

Partnered with Salt River Project and St Johns Mayor's Office

Plant is in same county as Navajo Nation

Ghent Generating Station

Primary Objective: Assess the feasibility of transitioning from coal to nuclear to support nearby industrial customers

- Repowering Assessment – Assess feasibility and understand value of physical and human assets
  - Siting Evaluation
    - Confirm the suitability of the site for a nuclear power plant.
  - Workforce Planning
    - Identify support needed for a nuclear plant.
    - Identify opportunities to retrain existing coal plant staff.
- Nuclear Benefits Beyond Electricity – Identify and evaluate opportunities to support industrial customers in region
- Community Engagement – Share study results with the community, address questions and concerns, engage community in next steps

Ghent Generating Station
Owned/Operated by Louisville Gas and Electric Company and Kentucky Utilities Company
Located in Carroll County, KY

Station retirement is planned in 2040s.

Full scale industrialization

- Workforce: ~375,000 additional workers to construct and operate 200 GW of advanced nuclear.
- Fuel supply chain: additional ~5,000 MT per year of additional fuel fabrication capacity.
- Component supply chain: The U.S. would need to substantially grow the component supply chain to support 200 GW of advanced nuclear; the largest gap is in large forgings.
- Licensing: The NRC would need to scale its license-application capacity from ~0.5 GW per year to 13-GW-per-year to meet projected demand.
- Spent nuclear fuel: The U.S. should continue efforts to identify sites for consolidated interim storage and permanent disposal of spent nuclear fuel.

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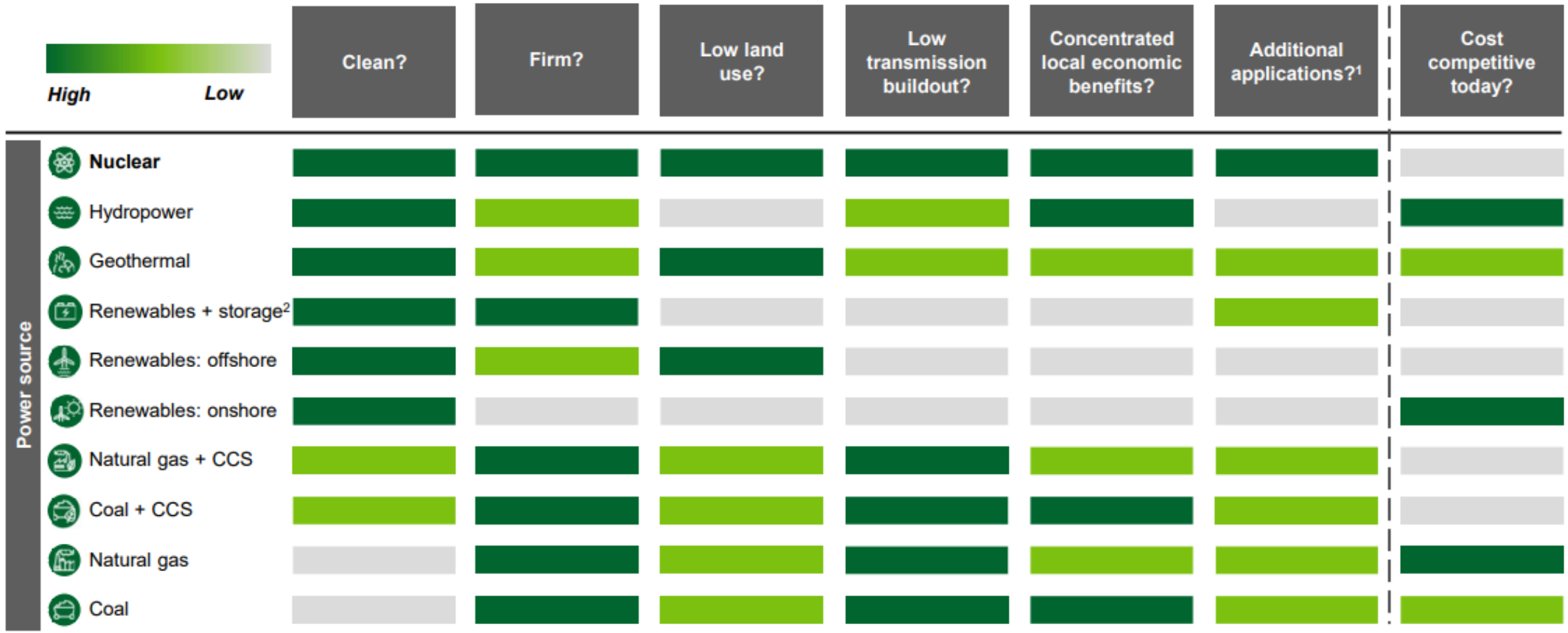
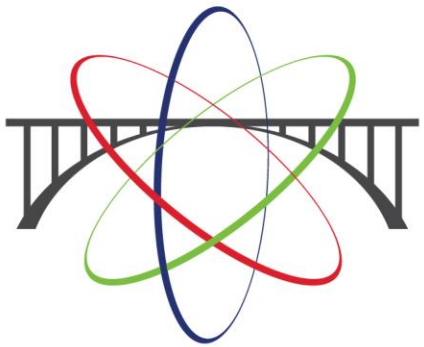
Six features contribute to advanced nuclear power's differentiated value proposition for a decarbonized grid (Figure 5)



1. Additional applications include clean hydrogen generation, industrial process heat, desalination of water, district heating, off-grid power, and craft propulsion and power
2. Renewables + storage includes renewables coupled with long duration energy storage or renewables coupled with hydrogen storage



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Gateway for Accelerated Innovation in Nuclear

GAIN: small enough to be nimble, big enough to be relevant

- Initiative from Department of Energy: Office of Nuclear Energy
- Mission is to simplify private industry's access to the assets of the DOE complex: expertise, historical data and facilities.
- Accelerated must match advanced nuclear developer pace and reflect the market window (next 5-10 years).
- Innovation is not just about technology. Be creative in all spaces with a bias toward taking risks.
- Focus on initiating and completing projects that support commercial deployment.

The GAIN Team


Director – Christine King
Deputy Director – Andrew Worrall

Senior Advisors
– Hussein Khalil
– Lori Braase


Operations Manager
Holly Powell

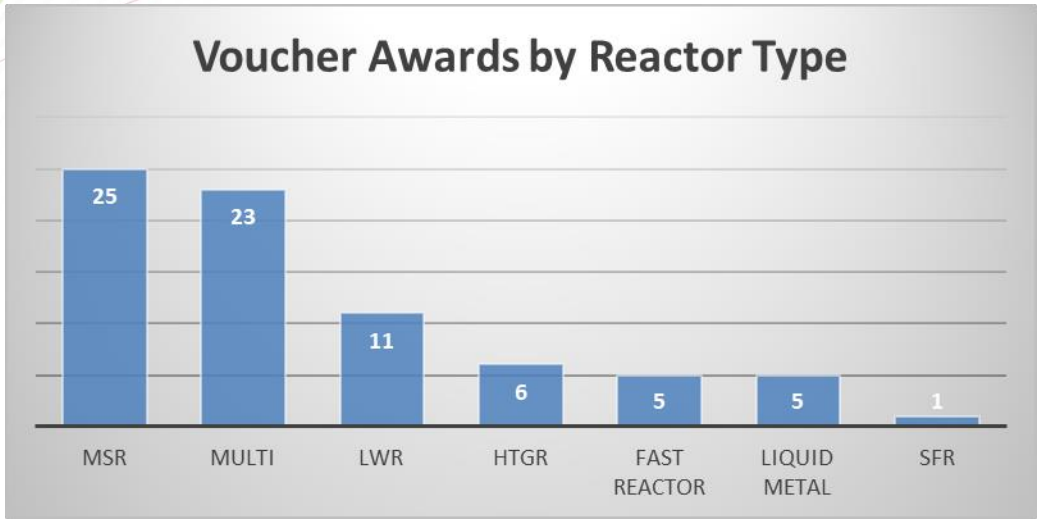
- **Administrator**
  Teresa Krynicki
  
- **Communications Liaison**
  Donna Kemp Spangler
  
- **Project Coordinator**
  Emily Nichols
  

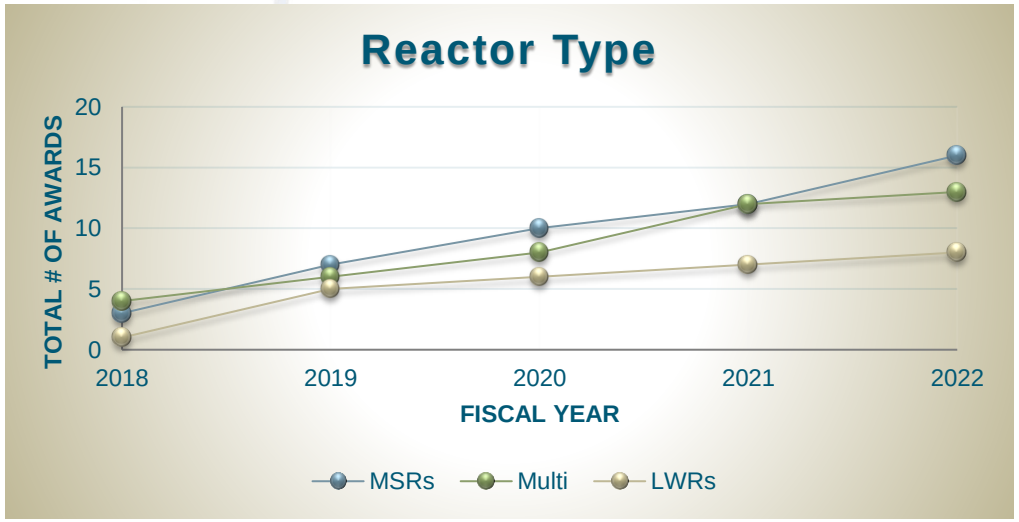
Innovation & Technology Manager
Chris Lohse

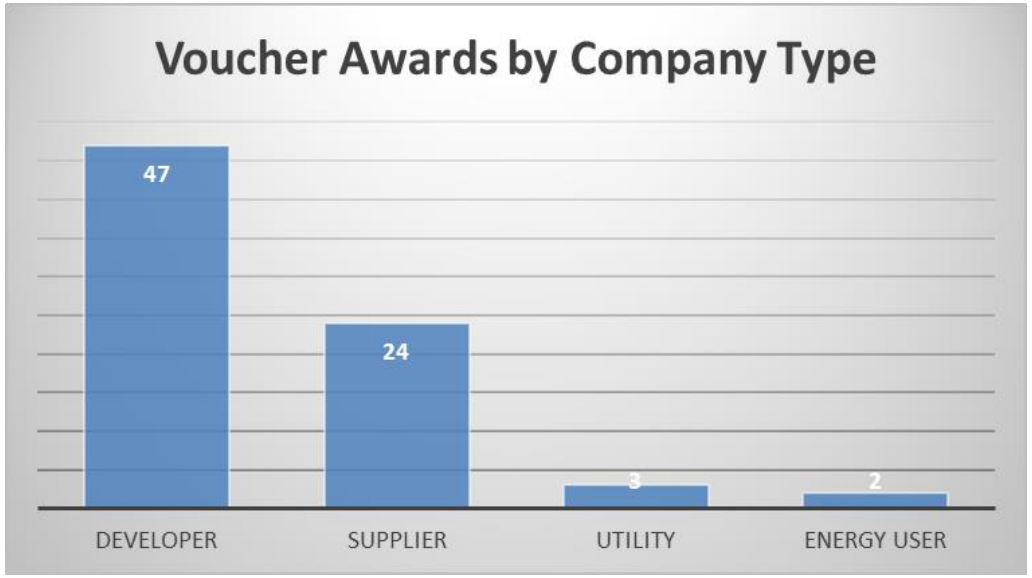
- **Voucher Principal Investigators**
- **National Lab Technical POCs**
- **Process Modernization**
  Rachel Taow
  
- **Regulatory Interface**
  Jim Kinsey
  

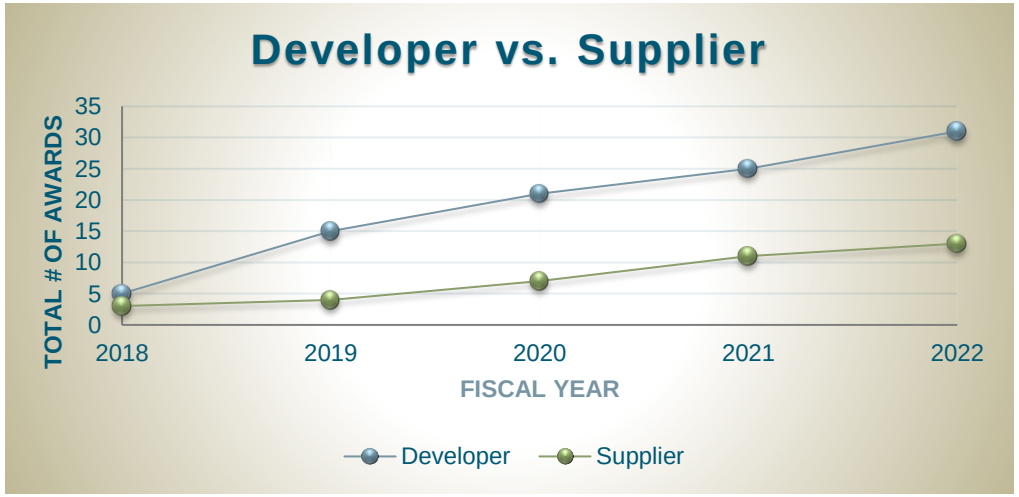
September 12, 2022

Voucher Statistics – Rx and Company

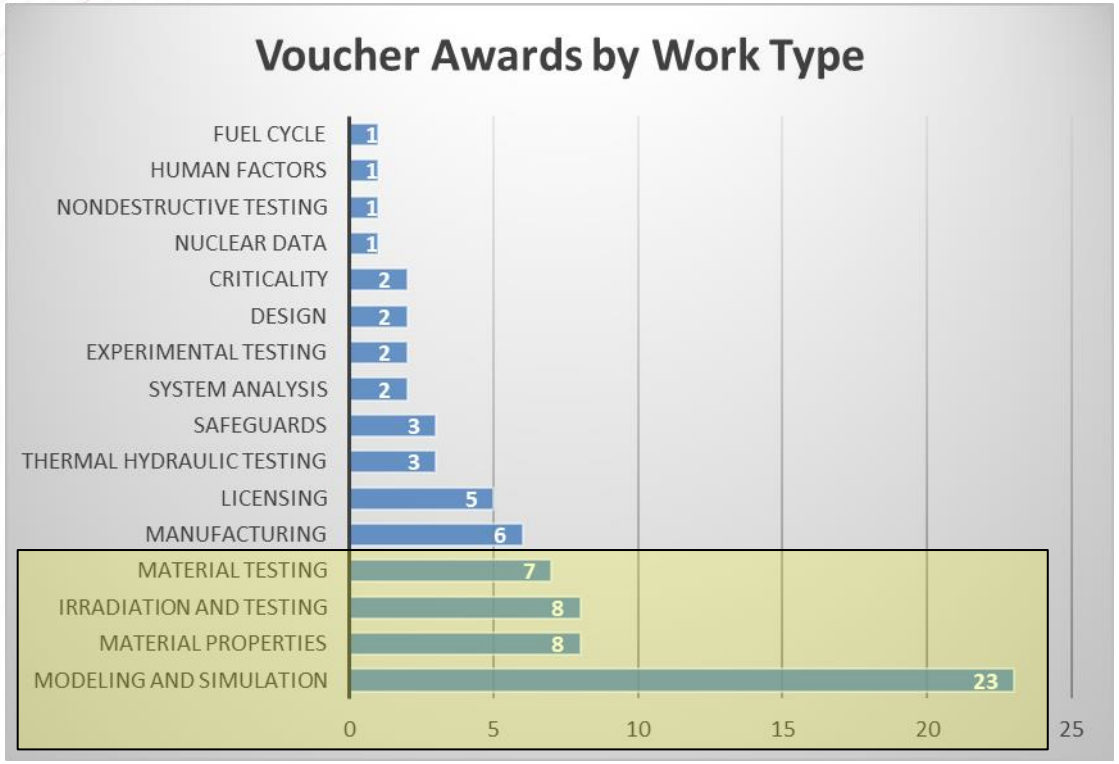


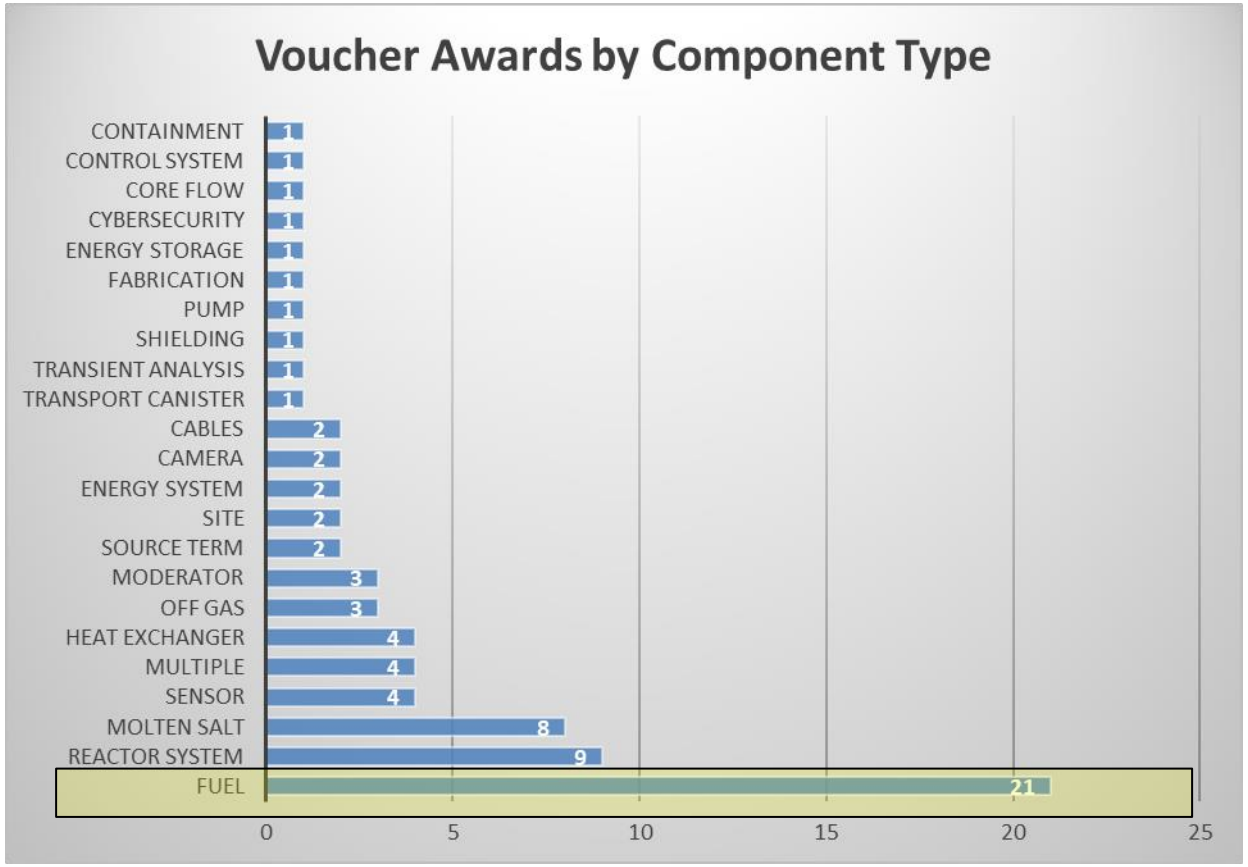






Voucher Statistics – Work Areas





National Lab and Regional Visits

- GAIN works with each lab to curate a visit that highlights their capabilities directly related to advanced nuclear development
- Industry partners tour the lab and get time to meet the researchers and explore potential areas of collaboration
- GAIN will also visit local companies involved in the development of nuclear technology to understand their perspective and needs.
- Meet with local leaders to understand economic development activities underway or planned.
- Use our social media platforms to share the highlights of the visit

SCOT FORGE